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AUTHOR Raitt, David I.
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ABSTRACT

Written from the viewpoint of an observer of the computer industry and a CD-ROM user, this report looks at CD-ROM evaluation guidelines; notes the performance of publishers; and comments on successful product design. It is contended that some software publishers are jumping on the CD-ROM bandwagon, and are guilty of: (1) putting "any old stuff" (literally) on CD-ROM; (2) rushing to put out CD-ROMs for the sake of being first; (3) putting an odd combination of information on CD-ROM; and (4) not paying suitable attention to user needs--i.e., not doing adequate market research, not giving sufficient thought to product design, not properly testing the product, requiring users to have unrealistic workstation configurations, and overpricing their products. An overview of product coverage and contents is then given, and the equipment necessary to run a CD-ROM system and problems associated with incompatibility are discussed. Qualities of specific software are also described, such as layout consistency, clarity of messages, compatibility, and ease of installation. The paper concludes by suggesting ways in which CD-ROM publishers can improve their marketing research and product design. (16 references) (SD)

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EVALUATING CD-ROMS: AN OBSERVATIONAL PERSPECTIVE

David Raitt, The Electronic Library

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CD-ROMs; Evaluations; Guidelines; Hardware requirements; Market research; Optical publishing; Product design; Search software; User studies

Abstract: CD-ROM products are springing up right, left and centre with many would-be publishers jumping on the bandwagon with almost indecent haste and with seemingly little market research and attention paid to users wants and needs. Are publishers putting material on CD-ROM just for the sake of it? And whose sake is it anyway - theirs or the users? Do such products need users rather rather than users need them? The paper reviews some guidelines for evaluating CD-ROM products by users and for users and discusses some of the issues in conceptualizing, designing, marketing and using such products from a users' viewpoint.

1. INTRODUCTION

In an area as new and interest-generating as CD-ROM it is hard to be the first in print in any aspect of it. Someone, somewhere will be thinking the same things and writing them up. Whilst I was conceiving the idea for this paper, at least two others appeared which covered similar ground. However, there is always room for more - consensus never hurts; reviews of the literature are usually helpful and thus bolstered by other articles I can perhaps be more contentious. There are currently over 400 commercial CD-ROM products available and whilst my personal experience of using CD-ROMs is not as extensive as some, I have seen many others in operation at various exhibitions and I have read reviews and descriptions of most. Thus what I have to say is as much from the viewpoint of an optical industry observer as a user. And I ask (rhetorically) as much as I say. First, the paper looks at some CD-ROM evaluation guidelines; notes how some publishers appear to be behaving, by giving examples of product covefage, equipment required and retrieval software; and then goes on the make some comments on market research and successful product design.

2. EVALUATION GUIDELINES

A number of guidelines are available for evaluating CD-ROMs. One of the earliest was Learned Information's CD-ROM Review Guidelines (Ref. 1) which detailed the structure and format to be followed by reviewers when evaluating CD-ROM products. Among the items to be considered by reviewers are the workstation configuration and installation procedure plus an assessment of the

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amount of computer expertise required; the supporting documentation both off and on-disk; how easy the product is to use and what features are available to the user; any data processing software for generating graphics or statistics or the like or for further use with word-processors or spreadsheets; test searches to compare seek times and retrieval power; on-screen display clarity and comprehension; and comparison of online, print and CD-ROM versions of the database, encyclopaedia or whatever (including price). The purpose of these guidelines is to produce a review which will provide sufficient information about the product so that readers (eg librarians) can decide whether or not they want to consider acquiring it.

Once a library or information centre has acquired a CD-ROM, it may wish to evaluate it before deciding to purchase it or others. Herther (Ref. 2) discusses practical issues involved in buying and evaluating CD-ROMs. Much of the article is devoted to determining the value of the CD-ROM title itself. This involves eight separate decision areas, namely: accuracy of and documentation for the database; appropriateness of the product for the clients; ease of use and comprehension; authority and credibility of the product; content analysis; comparison with similar products (both other CD-ROMs and online/print); revisions, updates and other special services; and overall value, interest, worth.

Taking evaluation criteria a step further, York (Ref. 3) gives some guidelines for selecting CD-ROMs for collection development in an academic environment. The thirty criteria, intended for use when considering optical products for purchase, are listed under the headings of: collection development considerations; vendor considerations; administrative considerations; and searching/system capabilities. The administrative considerations include such items as whether the equipment needed for the CD-ROM meets established standards and is compatible with equipment presently used on campus.

A CD-ROM evaluation checklist with four categories of hardware; software; product content; and program management, is provided by Littlejohn and Parker (Ref. 4). They also give a general questionnaire for evaluating CD-ROM products which covers points in the checklist. Questionnaires are also appended for both student and library evaluation of CD-ROMs. While there is a growing number of surveys of CD-ROM evaluations being carried out in individual libraries of all types, there is also an increasing number of surveys of CD-ROMs and their use being carried out on a national or regional level. Examples of surveys already executed, in progress and planned include those in the United States, UK, Canada, Australia, Europe (CEC), Scandinavia, The Netherlands, Brazil, Mexico and Cuba and one is also planned to cover all developing countries.

In the main, though, these evaluation guidelines and surveys, whilst serving an extremely necessary and useful function are, in effect, like shutting the stable door after the horse has bolted. They can only be employed when the product is already commercially available.

3. THE BANDWAGON SYNDROME

Now we all know the applications of CD-ROMs in libraries; education; publishing/editing; online searching; science and technology; marketing and production to name but a few. And we all know when it's appropriate to use CD-ROMs for an archiving or publishing project (when you want to economically disseminate large stable quantities of digital data relatively infrequently

(Ref. 5)). Or do we?

Based on my own experience and readings and the content of such guidelines as above it seems to me that some would-be publishers are jumping on the CD-ROM bandwagon and are guilty of any or all of the following:

- putting any old (literally) stuff on CD-ROM
- rushing to put stuff on CD-ROM for the sake of it or to be first
- putting on the disk an odd mixture of information
- putting on the disk what they want rather than what users might want and need
- not doing sufficient market research into what material and features are required by users
- not paying sufficient attention to users' needs
- not giving sufficient thought to the design of the product
- not doing proper testing of the product and its features
- requiring users to have unrealistic workstation configurations
- pricing their products too high for the content

Examples of such heinous crimes abound and some of these points will be examined below under the headings: product coverage/contents; necessary equipment; and search software and documentation.

4. PRODUCT COVERAGE/CONTENTS

CD-ROM products fall into quite a few categories (Fig. 1) with many in highly specialized areas, for example, meteorological data; navigational flight paths; images of Uranus; aircraft manuals; auto parts catalogues - with some organizations (like Boeing, US Navy, British Airways, NASA, General Motors) producing them for more or less in-house use. However, in many cases, if such information is not proprietary, the information providers and/or publishers feel why shouldn't they try and sell it. But just what is the justification for putting material on CD-ROM? To make a fast buck? To satisfy a genuine user need? To gain experience?

TERMDOK - a multilingual technical dictionary - contains terms (with translations in different languages) from some 26 different Swedish glossaries. The only trouble is that a substantial number of the glossaries (in such rapidly developing fields as astronautics and industrial engineering) date from the 1960s and early 1970s. The CD-ROM publisher wanted to get experience in using a new media for terminology production and usage - laudable in itself, of course, - and so rushed ahead to produce and sell the disk without considering either the user or the product. Not only does the CD-ROM contain data badly in need of updating, but about one fifth of the contents relate to forestry and timber, the price is approaching $1000 and the help screens are most unhelpful.

Of course, Walters Lexicon, the publishers of TERMDOK, are not the only ones experimenting with CD-ROM and obviously that is their prerogative and

clearly such experimentation could lead to some highly interesting and useful products. When it first appeared BOOKSHELF seemed to offer a peculiar mix of information - only one or two of each of the ten tools on the disk being of real use to any one individual and thus maybe hard to justify purchasing. However, in these (still early) days of networking CD-ROMs then there is probably more call for it because several different types of users in an organization (eg editors, translators, general public, reference librarians, secretaries, mail room) can all access the same single disk for the tools they require - thus better justifying the cost. An interesting question is did Microsoft evolve the product originally with networking and multi-user access in mind?!

TOM, from Information Access Co., is an $1500 index from 1980 to date to 100 popular general magazines for secondary school libraries. How much space does that take up on a CD-ROM -especially as the full texts are available on microfiche? How much space does TERMDOK use? How much does the Online Newsletter available on CD-ROM take? Does it matter? The price matters. Is CD-ROM the best medium for such offerings or just an alternative? And what happens if (when for some certainly) CD-ROM products fall by the wayside. Where does that leave the library or subscriber? Some products (quite apart from samplers) have never been updated since they were issued. The Physician Library from Ellis Enterprises, a collection of medical books, periodicals and information aimed at general practitioners is to be updated biannually it seems. Will any GP want to wait so long for an update? Isn't it important to keep up to date with new publications more regularly than that? (They could supplement by looking at Books in Print - on CD-ROM of course!). Will GPs buy it in the first place? I mean won't s/he have many of the books and journals already on the shelf in the consulting room? Will the average GP possess a CD-ROM player (possibly if s/he is into MEDLINE on CD-ROM)?

And talking of updates, the range seems to be anywhere from weekly to five-yearly (though not a fortnightly service?) (Fig. 2). The frequency and importance of updates is tied in with where you live and what you are used to. Printed encyclopaedias are not always updated every month or even year. There is typically several months (often a year) before citations get into online databases. If abstract journals are surface-shipped to somewhere remote like Australia or Cuba then there can be several months postal delay. If this is what you are used to then you might not be too bothered that a CD-ROM is updated only once a year or so. On the other hand, it it is shipped airmail and you get it in a few weeks then this could be a point worth emphasizing in publishers' publicity for the product because it could open up a whole new search service dimension. Naturally costs are involved - the range for CD-ROM product seems to be anywhere from free to $75.000! If you don't make so much use of a given database then it may still be cheaper to access it online even from overseas.

One is forced to ask how much market research was done for some products. How necessary are some of the current CD-ROM products? Really. Do some products need us more than we need them? How many CD-ROM products are technology for their own sake? How many are overpriced for what you get?

5. NECESSARY EQUIPMENT

There are articles aplenty on the often frustrating attempts to run standard, compatible CD-ROMs on standard, compatible drives with standard, compatible micros (eg Refs. 6,7,8), but still CD-ROM publishers are bringing out products which require a certain specialized hardware configuration. I'm

sure some CD-ROMs will never be used to their full extent by many actual and potential buyers simply because the publisher has designed a product without any firsthand knowledge or consideration of the existing marketplace.

It is only in the last few years that micros have become fairly standard equipment in library and information environments and I'm willing to bet that not all of these have a colour monitor, especially if it was bought to replace the dumb terminal used for online searching. Yet the Harrap's Multilingual Dictionary requires precisely that. From my review of this CD-ROM, this is a totally unnecessary restriction and whilst colours may look pretty, exactly the same effect could have been achieved with highlighting. The Harrap's disk also needs the EGA card (an ordinary Hercules card won't do the job so well) for displaying the optional Chinese characters. The publishers told me that they would probably be bringing out a monochrome version later (translate as afterthought). But why couldn't they have done that in the first place. Does everyone really have a colour monitor? Will those that don't rush out to upgrade? Maybe yes; it seems that in the UK at least, public libraries are buying completely new workstations for CD-ROMs because their existing micros are already too heavily used. And clearly if you are buying new then a colour monitor is likely to be standard.

The Facts on File Visual Dictionary on CD-ROM expects users to have not only a CGA or EGA card and colour monitor but also Microsoft Windows and mouse, an audio interface card, and an external speaker or headphones. That's quite a lot of extras if you don't have them - and many earlier CD-ROM drives still in use don't have audio output - though most of the newer models do. More and more it seems the user is expected to have audio output (just like a colour monitor!) plus the necessary software for CD-ROM products offering music or pronunciation guides (or interactive video or even document voice notes). In fact, an audio chip will be required for reading CD-ROM XA applications and while this may be put on an expansion board in the micro, some manufacturers are considering putting it in their CD-ROM drives - which could be handy because with one thing and another (including a mouse) how many empty slots are still available in many pcs?! And how much memory is still available for software like Windows?

If you want to view the photos, illustrations, tables and figures in the McGraw-Hill CD-ROM Science and Technical Reference Set then you need to have the Reference Technology Docusystem Workstation. Well, I mean, I don't know how much that costs but I expect it's a bit more than the $300 for the CD-ROM - so who is going to rush out and buy it if you've already got something else or if you don't have another application for it? (Incidentally, many of the CD-ROM Directories don't tell you you need such a piece of equipment!) Maybe I'm wrong - maybe everyone has one except me. Or take the Selenia Encyclopedia which is the electronic version of a popular Italian encyclopaedia complete with images and is apparently a worldwide bestseller CD-ROM with 10.000 copies already sold. The recommended hardware for running it is an 8088 CPU Cesvint Optica EP88! I expect most of you will have at least one of those too in your library - again I'm probably the only person that hasn't.

To run the Jeppersen Charts it's recommended you use a LaserTrak FP100 portable system complete with LaserTrak drive. LaserTrak CD-ROM drive? (That's not among the score or so I have come across so far!) No other CD-ROM seems to use that drive - so what happens if you have an IBM portable system with a Hitachi or Philips or Sony or Toshiba drive? Well you won't be able to see where to navigate to. The Universe of Sounds CD-ROM requires you to have a Pro CDT system at $18-25.000. At least the LaserTrak costs only $2995 for the whole system including personal computer!

But the question is can you use all these different systems for other tasks and applications? I mean imagine having to buy a completely different system for any number of different CD-ROMs. Who is going to bother? How many more copies of these CD-ROMs mentioned above (and, of course, there are others) might have been sold if the publishers had done a little research into the kinds of equipment actually being used now by potential CD-ROM buyers? Of course, some people will be using the Docusystem and some will be locked into the LaserTrak FP100 system - but with a little extra thinking ahead the products could have been made available to a far wider existing market. Of course people buying equipment today will make sure they get a colour monitor with a mouse and Windows or equivalent and a CD-ROM drive with audio output at the outset; and of course many people will upgrade given the right incentive at the opportune moment - but I believe that those who haven't yet got more modern equipment will wait until a far greater choice of CD-ROMs becomes available to justify the expense.

6. SEARCH SOFTWARE AND DOCUMENTATION

Besides needing fancy equipment the full value of some CD-ROM products is only realized with additional software - such as a word processor, statistical analysis package, spreadsheet or windowing environment. Sometimes the product expects to use your software and invokes it at installation time and will provide facilities for importing/exporting data as well as processing it and sometimes it contains the software as an extra. With some products the retrieval software is included on the CD-ROM and can be run from the CD-ROM, with others it appears not to be included on the CD-ROM and is thus run from a floppy or a hard disk.

Quite a lot of CD-ROM software is not so well designed from a user point of view - often being sluggish and offering poor indexing and retrieval capabilities (Bookshelf); the same function keys not having the same functions on different screens (LaserQuest); inconsistent layouts with the same message or information not appearing in the same place on different screens (McGraw-Hill); cryptic help messages (TERMDOK); endless loops - the only way to exit from the Harrap's Multilingual Dictionary I received was to reboot or do CTRL C since hitting the PF10 Exit key only took me back to the start screen each time! Bookshelf does not permit Boolean NOT, while the Science and Technical Reference Set does not permit Boolean OR. Some CD-ROMs allow you to save to disk in ASCII format, others in a word processing format. Little things very often - caused by insufficient attention to product design, insufficient consideration of how the product might be used, and insufficient testing by outsiders unconnected with the product - and all occasioned no doubt by wanting to rush out with a CD-ROM as soon as possible.

Although there are some quite good CD-ROM software packages available, any amount of CD-ROM publishers (around 50%) use a proprietary software which as often as not appears not to have been field-tested in many cases. A quick count in the 1989 CD-ROM Directory (Ref. 9) reveals that there are 72 different types of software being used for CD-ROMs. A couple of publishers (SilverPlatter and Datext) have over twenty products each using their software; others well up include Wilson, OCLC, Online Computer Systems and Microsoft. All the others have less than ten products using their software and just over half (38) have only one CD-ROM product using that software. On balance, it seems sensible for a publisher to use existing software rather than reinvent the wheel (appropriate expression in view of the shape of CD-ROMs!) for the following reasons: the major packages have already been tried and tested and hence improved in response to users' comments; the major

vendors are known and will thus have a good reputation; users will be familiar with the software from using other products; and, of course, it will probably save development time and money. Interestingly enough, Walters Lexicon is contemplating switching from the more well-known German Dataware software to the less well-known Swedish Optosoft software for Version 2 of TERMDOK since it apparently offers many new possibilities.

Some CD-ROM publishers make it very easy indeed to install the software - to a hard disk, say, with appropriate directories being created automatically and no changes being made to CONFIG.SYS or other files. With others it's a real palaver - one floppy for this CD-ROM drive, one for that, one for something else. Harrap's expects you to boot from the A drive because the software may modify your files. Instructions are not always too helpful or complete - and if I'm paying $1000 for a CD-ROM then I expect more than just a couple of crudely typed sheets of A4 paper each one supplementing other instructions elsewhere to tell me how to install it (Harrap's Multilingual Dictionary). Printed user manuals range from non-existent to pretty comprehensive (Harrap's). Similarly with on-disk help screens and instructions for use which are often poor and which run the whole gamut from nothing at all (Harrap's) to skimpy, terse and unclear (TERMDOK) to too much in too little space (McGraw-Hill Science & Reference Set) to probably just right (do we have Goldielocks and the Three Bears on CD-ROM yet?!)

7. ASSESSING THE MARKET

Some of the points above are reinforced by Jackson and Kinyon (Ref. 10) who also question the suitability of products for CD-ROM; who urge CD-ROM publishers to use a major retrieval system rather than develop their own; and who list several important design and marketing considerations (such as automatic online updating; frequency of updates; good documentation and support; following standard practices for highlighting; and reasonable pricing) which publishers should also take into account.

Some of the major CD-ROM publishers, of course, already take these things into account and continually strive to improve and enhance their products by providing features and facilities in response to users' comments and needs - for example, SilverPlatter with its MultiPlatter system. Some do conduct marketing research to test user reactions to and demand for products - an example is the British and French National Bibliographies on CD-ROM pilot project of the Commission of the European Communities (CEC). The market for ADONIS was also extensively researched before the product was launched. Maybe national libraries with CEC backing and big publishing company consortiums are better placed to afford such market surveys which other smaller publishers cannot - though Williamson considers that assessing the market is probably the most important task facing the CD-ROM publisher (Ref. 11).

This assessment, which must be done at an early stage in the production process, may involve commissioning formal market research as well as reviewing published market research reports and studying competitors products. A lot of the current CD-ROM products are based on other successful products in different media - online, print, microform. According to a list drawn up by Priestley (Ref. 12) just about the only type of materials not considered to be suitable (yet) for CD-ROM are leisure literature and textbooks - but already we have Sherlock Holmes on Disc (complete with some medieval poetry) and what is claimed to be the first entertainment CD-ROM product - a popular computer game called Defender of the Crown which has stereo orchestral soundtrack, sound effects and spoken commentary instead of captions.

A good, comprehensive publisher's view of the whys and wherefores of planning a CD-ROM project is given by Baldwin of Pergamon Compact Solution (Ref. 13) - but, just as many publishers do not do extensive market research before launching their CD-ROM products, so I am sure that not every publisher goes through these steps with such a degree of thoroughness - possibly because of limited resources. That many products are brought to the market without obvious planning and preparation is evidenced by the proliferation of disks covering the same sources - seven or eight on MEDLINE and that's not counting subsets; several on ERIC and NTIS; virtually every catalogue of computer hardware and software under the sun; a couple on AGRICOLA; a couple on the Census of Agriculture; and many more copy-cat examples, hidden partly because CD-ROM directories cannot seem to agree on any standard name for the products (eg the Hong Kong Census is to be found under this title in one directory, but under Census of Hong Kong in another; the Jeppersen Charts on CD-ROM is listed like this under J in one directory but as IZ Services in another!).

In fact, it is not only the name that causes confusion. Nicholls notes that FINDIT from Reteaco is one of the major types of software used for CD-ROMs (Ref. 14). In the CD-ROM Directory, which lists 392 products, only three are listed as using FINDIT, though the blurb in the company section states that Reteaco has helped produce some 100 databases on CD-ROM - half for clients' internal use and half for commercial use. Why aren't the commercial fifty listed in the Directory?! It was also noted earlier that the CD-ROM Directory listed some 70 software packages used on CD-ROMs. Over 100 companies producing search and retrieval software companies ostensibly for CD-ROM technologies are listed in the 1989 Optical Information Systems Buyers Guide and Consultants Directory (Ref. 15). That's quite a lot for one directory to miss and the other to pick up. But the latter lists companies like Borland International, VTLS Inc., Inmagic, Cuadra Associates - now while these do indeed produce search and retrieval software is it really used in CD-ROMs at present? - even though it might be suitable for such an application.

8. SUCCESSFUL PRODUCT DESIGN

Steve Arnold, in a specially-commissioned book chapter (Ref. 16) notes that successful CD-ROM products share several common denominators: they give users specific benefits or solve a problem; the price of the product does not constitute a barrier to the user; the products provide accurate, needed information which customers describe as quality; the companies producing them have a solid reputation to give customers assurance of technology stability; the companies provide exceptional pre- and post-sale service and support; and the products have an elegant and appropriate user interface. He also points out that products increase their chance of failure in the market when publishers confuse their own excitement and pride in their offerings with the customers'. Arnold goes on to provide a product development checklist and five strategies for developing a winning product, both of which all potential CD-ROM publishers would be advised to read!

Nothwithstanding that publishers exist to disseminate information for pecuniary profit and thus need to experiment with and access a new publishing medium which seems full of potential (after all it is only through a certain amount of experimentation and serendipity that you come across new applications) it would appear that the attitude of many publishers is that since CD-ROMs are relatively easy and cheap to produce, then let's go for it anyway and charge the user a hefty wack for the experimental disks. Thus the user is, in fact, financing the experiments and paying for the risk the publisher takes.

Evaluations of CD-ROMs after they have already appeared in the marketplace obviously help potential buyers make up their mind whether or not to acquire a particular product. Hopefully, the reviews and comments also are of benefit to publishers and/or information providers and are taken into account not only in the design of upgrades and new versions, but also in the design and production of completely new products.

Carefully constructed CD-ROM surveys can help the publisher to some extent as well as the drive manufacturers, information providers, librarians and others in the chain, since they can elicit information on product use, equipment used and subject areas which are not currently covered. A survey coming to a conclusion in Europe and Scandinavia as well as one in the USA based on the same questionnaire asked what type of CD-ROM drive was used. It could, with hindsight, also have asked what kind of workstation configuration was used for CD-ROMs (ie was there a colour monitor, audio output, mouse etc).

Similarly, past surveys of information technology in UK public and academic libraries have really only asked which micros were used and what for and have not specifically requested such details as to whether a colour monitor was used, what kind of graphics card was used, was audio output available, what expansion cards were used, how many slots were still available for other peripherals and so on. Such additional details might have proved useful to potential publishers - we are afterall part of the same information industry and should thus help each other as much as is practical in common self-interest.

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D. Raitt, Frankenslag 179, 2582 HL Den Haag, The Netherlands

- programs, sources codes
- maps/charts, geographic boundaries
- text, bibliographic
- data, statistics, census, numeric
- catalogues, manuals, standards
- graphics, images, fonts, clip art, half tones, photos
- addresses, phone numbers, directories
- audio, speech, sound samples
- activities, research

Fig. 1. Indication of CD-ROM Database Types

(databases fall into more than one category and cover the whole range of scientific, technical, medical, economic, business, social, product, historical and other subject areas)

- weekly (52 times per year)
- monthly (12 times)
- ten per annum (10)
- bi-monthly (6)
- five per annum (5)
- quarterly (4)
- three per annum (3)
- semi-annual (2)
- annual (1)
- bi-annual
- five yearly
- intermittent
- as requested

Fig 2. Frequency of CD-ROM updates